CURRENT PROCUREMENT SPECIFICATION DESIGN REQUIREMENTS FOR U.S. NAVY AIRCRAFT

Sara J. Ketcham
Naval Air Development Center
Warminster, Pennsylvania 18974
USA

SUMMARY

An important step in the acquisition of a new naval aircraft is the review of detail specifications by materials and process specialists. The specifications are studied for compliance with SD-24, MIL-F-7179 and MIL-S-5002. In addition, reports on Adhesives, Lubricants, Finishes and Corrosion Control Plans are furnished as a contractural requirement. Some of the most important considerations are the materials to be used, designs incorporating dissimilar metals, and watertightness. Test programs may be necessary to validate a particular choice of material or design. In the final analysis, however, cost and performance are the overriding considerations so some compromises usually have to be made. The challenge is to obtain as corrosion-free a vehicle as possible within these constraints.

INTRODUCTION

It is only in the last ten years that materials engineers have been invited to take an active part in the weapons acquisition process. Documents such as SD-24, General Specification for Design and Construction of Aircraft Weapons Systems (Fixed and Rotary Wing Aircraft) was invoked as a contractural requirement, but the sections concerning materials selection were very general. Two other specifications were also usually called out, MIL-F-7179, General Specification for Finishes and Coatings for Protection of Aerospace Weapons Systems and MIL-S-5002, Surface Treatments and Inorganic Coatings for Metal Surfaces and of Weapons Systems. Adherence to these specifications was frequently perfunctory at best.

As higher performance aircraft evolved and the higher strength alloys used were by nature more susceptible to corrosion attack, an awareness began to develop that materials selection should receive more than passing attention. The situation has improved to the extent that materials reviews are included as part of all new Navy aircraft system acquisitions.

UPGRADING REQUIREMENTS

The documents mentioned previously have all been revised or are in the process of being revised to reflect state of the art developments in corrosion control. In SD-24 for example, the aluminum alloys approved for use are all of the exfoliation and/or stress corrosion resistant tempers. Use of magnesium alloys is severely restricted. A requirement for a corrosion control plan is imposed.

MIL-F-7179 and MIL-S-5002 are being revised to reflect the experience gained on operational aircraft over the last decade and the improved coating systems now available for use. Sealants are specified wherever dissimilar metals must be used and wherever moisture would have ingress. Coating systems are being standardized and those with marginal performance eliminated.

MIL-F-7179 originally specified different levels of protection depending on the severity of the environment to be encountered. These distinctions have been eliminated since they were arbitrary and with industrial pollution and acid rain no longer relate to any actual service environment.

The status of the revisions mentioned above is as follows:

SD24L - Vol. I, Fixed Wing Aircraft - issued June 82

SD24L - Vol. II, Rotary Wing Aircraft - final review underway

MIL-F-7179 - undergoing industry and tri-service coordination

MIL-S-5002 - revision ready for industry and tri-service coordination

A new document is being developed to help combat the water intrusion problems being encountered with newer aircraft. This document is MIL-W-0067298(AS) entitled General Specification for Testing Watertightness of Aircraft (to be used in lieu of MIL-W-6729A).

FUTURE OUTLOOK

Although improved materials and procedures are being incorporated into contractural documents, manufacturers frequently claim their use will add to the cost of the aircraft, add weight, or change the aerodynamics in an unfavorable manner. In most cases

performance and cost override all other considerations and waivers may be granted. The challenge to the materials engineer is to obtain as corrosion free a vehicle as possible within these constraints.